

PATENT SPECIFICATION

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(54) BLIND

(71) We, IMPERIAL CHEMICAL INDUSTRIES LIMITED, Imperial Chemical House, Millbank, London SW1P 3JF a British Company do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

10 This invention relates to blinds and in particular to blinds comprising slats.

The proportion of incident light transmitted by a Venetian blind is determined by the angle which the plane of the slats makes with the direction of the incident light; a maximum of light being transmitted when the plane of the slats is parallel to the direction of the incident light and a minimum when the slats are perpendicular to the direction of the incident light. However when the light is transmitted, passage of air through the blind is also possible and this passage of air may be undesirable. Roller blinds, on the other hand, at least restrict 25 the passage of air but are often opaque, and although allowing of decoration and aesthetic appeal do not afford the degree of control of light transmission obtainable with Venetian blinds.

30 We have now found that a transparent or translucent sheet on which a plurality of strips are hinged affords a device which can transmit radiation while restricting the passage of air (or other gas) and which can 35 restrict or prevent transmission of radiation or modify the wavelength of transmitted radiation. Furthermore, where the sheet is flexible, the blinds may be rolled up to make storage easy. In a modification of the blind, 40 apertures formed in the sheet allow controlled passage of gas through the device.

Accordingly the present invention provides a blind comprising at least one transparent or translucent sheet, a plurality of 45 strips integral with or mounted along one

edge of the strip on at least one of the surfaces of the sheet such that the angle between the plane of the strip and the surface of the sheet may be varied, and means for effecting variation of the angle.

50 Where the blind has a tendency to curl up means are provided for maintaining the blind essentially taught. Conveniently a rod or bar is attached to the lower end of the sheet to keep it taught.

55 The sheet may be rigid or flexible. Flexible transparent sheet is preferred and a film of thermo plastics material is particularly preferred since the blind can then be conveniently manufactured, operated and stored. We do not however exclude the possibility that the sheet may be a perforated metal foil, woven or non-woven textiles, or glass or other suitable inorganic material. The sheet may be coloured or 60 colourless and various fillers or reinforcing agents may be incorporated into it. Perforations of a variety of sizes and shapes 65 may be present in the sheet as long as the residual material has sufficient mechanical 70 and optical properties to function as required. Choice of the structural and physical details of the sheet will be influenced *inter alia* by the aesthetic appeal desired, and by the wavelength and quantity of 75 radiation and in the light of the subsequent discussion will present no problem to the skilled man.

75 The strips may be flexible or rigid. Preferably they are flexible since the blind can 80 then be conveniently manufactured and stored. They may be the same as or different from each other and the sheet in respect of material, e.g. they may be formed from a thermoplastic material, colour, texture. They may have the same or different transparency, translucency, or opacity as 85 each other. They may have the same or different shape or size. Choice of suitable components will be influenced by the 90

aesthetic appeal required, by the wavelength and quantity of radiation, and for any particular application their selection will present no problem to the skilled man.

5 Composite strips may be used e.g. two strips of thermoplastic film may be laminated together. The thickness and coefficient of thermal expansion of the two strips may be chosen such that a composite strip 10 may be obtained which bends or rolls up as the temperature varies. Blinds comprising such temperature sensitive strips afford a means for automatically controlling the temperature in a unit by reducing the amount of 15 radiant heat emitted or absorbed by the unit e.g. they may be used to control the temperature of greenhouses. The coefficient of thermal expansion of materials suitable for forming the composite strips may be found 20 in "Fibres, Films, Rubbers and Plastics" by W J Roff, J R Scott and J Pacitti, published by Butterworths (London).

The sheet and the strips may comprise 25 components which polarise light e.g. tourmaline, quinine iodine sulphate, or uniaxially orientated thermoplastic film. The orientation of the components in the sheet and strips may be chosen so that as the angle between the strips and the sheet is 30 altered translucency develops.

The strips may be discrete entities mounted on the sheet by mechanical or adhesive bonding, which may be point or continuous. Alternatively the strips may be 35 an integral part of the sheet formed by distorting the sheet until it attains the desired configuration and then "locking" the sheet in this configuration, preferably creating a zone of preferential flexure at the junction 40 of the strips with the sheet. Suitable methods of mounting the strips on the sheet include welding, rivetting, stapling, sewing, application of heat or solvents, or the use of solvent based or melt adhesives.

45 Strips may be mounted on one or both surfaces of the sheet. Strips may be bonded to two sheets to form bridges between the sheets.

Conveniently the strips are mounted in 50 parallel but we do not exclude the possibility that the strips may be mounted at an angle relative to each other.

The strips may be in the form of open ended envelopes which may receive inserts. 55 These inserts may be colourless or coloured, transparent, translucent or opaque, formed from plastics, metal, wood, glass, textiles, or paper. Patterned effects may be obtained by the choice of appropriate combinations 60 of inserts.

Means for operating the blind between 65 an open and closed position include tape, string, wires, or rods which are attached to the strips at a point removed from the sheet so that the angle between the strips and the

sheet may be altered. Where a blind comprises two sheets and bridging strips between them, relative movement of the sheets may effect opening and closing of the blind.

70 Blinds according to the present invention may find use in thermal insulation. When the strips are coated with infra-red reflector metal e.g. such as an aluminium, or a semiconductor e.g. tin oxide, they may, in the closed position, reflect incident radiation so that heat transfer is reduced. Alternatively when two sheets are bridged by strips movement of air within the channels formed between the sheets is restricted, so that transfer of heat by convection is reduced.

75 The blind may be attached to a window frame so that a layer of air is trapped between the glass and the blind and this layer of trapped air may act as a sound and heat insulant. Methods of attachment 80 include for example a layer of adhesive on the edges of the blind, or locating the blind between plastic strips which are fixed to the window frame, or allowing the blind to dangle with a rod or bar at the bottom to 90 keep it taut.

Figure 1 is a perspective view of a decorative blind (a) in an open position, (b) in a closed position.

Figure 2 is a cross-section on the line 95 AA, BB of Figure 1.

Figure 3 is a cross-section of a reflecting blind.

Figure 4 is a cross-section of a blind having a striped appearance.

Figure 5 is a cross-section of a reflecting blind.

Figure 6 shows construction of a paper-coated blind.

Figure 7 is a cross-section of an insulating 105 blind.

Figure 8 is a perspective view of a blind which allows passage of air.

Figure 9 is a cross-section of a temperature sensitive blind.

110 In Figures 1 and 2, strips 1 of coloured opaque poly vinyl chloride thermoplastics film bonded to a sheet of transparent colourless poly vinyl chloride 2, are supported by tapes 3. A metal rod 4 is attached to the bottom of the sheet 2. Some of the strips have a pattern painted on them, so that when the blind is closed by releasing the tapes 3, the pattern 5 becomes visible.

120 In Figure 3, a colourless transparent polyethylene thermoplastic film 6 is forced into a corrugated configuration and then heat sealed to form envelope strips 7. Strips of metal foil 8 are inserted into the envelope strips 7, and a wood bar 9 is attached to the 125 bottom of the film 6. When the blind is closed, the metal strips 8 are presented as a reflecting surface.

130 In Figure 4, two sheets of colourless transparent polyethylene 10 and 11 are forced

into corrugated configurations, then contacted and heat sealed to form essentially parallel envelope strips 12 and 13. Strips of green plastic 14 are inserted in the envelopes 13, strips of yellow plastic 15 in the envelopes 13, and a wooden rod 16 is attached to the bottom of the sheets 10 and 11. The blind may be progressively closed by pivotally raising the strips 12 and pivotally raising the strips 13 until the position shown in Figure 4b is reached, the blind then appears to be yellow and green striped.

In Figure 5 strips of an aluminised thermoplastic film, e.g. Melinex (RTM), 17 are riveted by rivets 18 to a sheet of coloured translucent Melinex (RTM) 19. With the blind open diffuse light percolates through the Melinex sheet 19. When the blind is closed the aluminium layer 20 on the strips 17 presents a reflecting surface.

In Figure 6 a layer of paper 21 is glued to an inner face 22 of a colourless transparent plastics angular extrusion 23 which is provided with holes 24. Lengths of the papered extrusion 23 are adhesively bonded together, a metal rod attached 25 to the end extrusion and strings 27 with attached anchors 26 threaded through the holes 24. On raising the papered portions of the extrusions 23, a paper pattern is presented on one side.

In Figure 7 pairs of strips of colourless transparent Melinex (RTM) film 28 are adhesively bonded to two parallel sheets of colourless transparent Melinex (RTM) film 29. Strips of textile material 30 are inserted in each pair 28 and a wooden rod 31 is attached to the bottom of one of the sheets 29. In use the blind as a result of restricted movement of air in the channels 32 acts as a thermal insulator while allowing transmission of light. By moving one of the sheets 29 relative to the other by pivotal action of the strips 28, light transmission is reduced and the patterned textile material 30 becomes visible.

In Figure 8 coloured opaque plastic strips 33 are bonded to one face 34 of a colourless transparent plastics film 35 in which rectangular ports 36 have been stamped. Strips 37 of colourless transparent plastic are bonded to the reverse face 38 of the film 35. The strips 33 and 37 are formed with holes through which is threaded string 39 supporting anchors 40. When strips 33 and 37 are in the horizontal position as in Figure 8a, light and air is transmitted. In Figure 8b the transparent strips 37 have been raised so that passage of air is restricted while in Figure 8c the opaque strips 33 have been raised thus restricting passage of light and air.

In Figure 9 composite strips 41 are bonded along one long edge to a plastics transparent film 42 to form a blind. The

strips 41 are formed of a strip of white opaque plastics film 43 and a strip of transparent plastic film 44 which has a higher coefficient of thermal expansion than the opaque strip 43. In Figure 9 (a) the strips 41 are in the closed position and in Figure 9 (b) the strips 41 are in the open position.

WHAT WE CLAIM IS:—

1. A blind comprising at least one transparent or translucent sheet, a plurality of strips integral with or mounted along one edge of the strip on at least one of the surfaces of the sheet such that the angle between the plane of the strip and the surface of the sheet may be varied and means for effecting variation of the angle.
2. A blind as claimed in claim 1 wherein a bar or rod is attached to the lower end of the sheet.
3. A blind according to claim 1 or 2 wherein the sheet is flexible.
4. A blind according to any of the preceding claims wherein the sheet is a thermoplastic material.
5. A blind according to any of the preceding claims wherein the strips are flexible.
6. A blind according to any of the preceding claims wherein the strips are formed from thermoplastic material.
7. A blind according to claim 6 wherein the thermoplastic material of the strips is metallised.
8. A blind according to any of claims 1-5 wherein the strips and the sheet are formed of the same material having the same colour and texture.
9. A blind according to any of the preceding claims wherein the sheet and strips comprise components which polarise light, the relative orientation of the light polarising components in the sheet and in the strips being chosen so that as the angle between the strips and the sheet is altered the translucency of the blind is altered.
10. A blind according to any of the preceding claims wherein the strips are laminated.
11. A blind according to claim 10 wherein the lamella have different coefficients of thermal expansion.
12. A blind according to any of claims 1-10 wherein the strips bridge two sheets.
13. A blind according to any of the preceding claims wherein the strips are open ended envelopes.
14. A blind according to claim 14 wherein the open ended envelopes contain inserts.
15. A blind substantially as described and illustrated with reference to any of the accompanying drawings.
16. A method of sound and/or heat insulation wherein a blind according to any of claims 1-15 is attached to a window frame to trap a layer of air between the glass and the blind.

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17. A method of sound and/or heat insulation according to claim 16 and substantially as hereinbefore described.

18. A method of forming a blind according to any of claims 1-15 wherein a sheet of thermoplastic material is distorted to form strips which are integral with the sheet and zones of preferential flexure between the sheet and the strips.

19. A method of forming a blind according to any of claims 1-15 substantially as described and illustrated with reference to any of the accompanying drawings.

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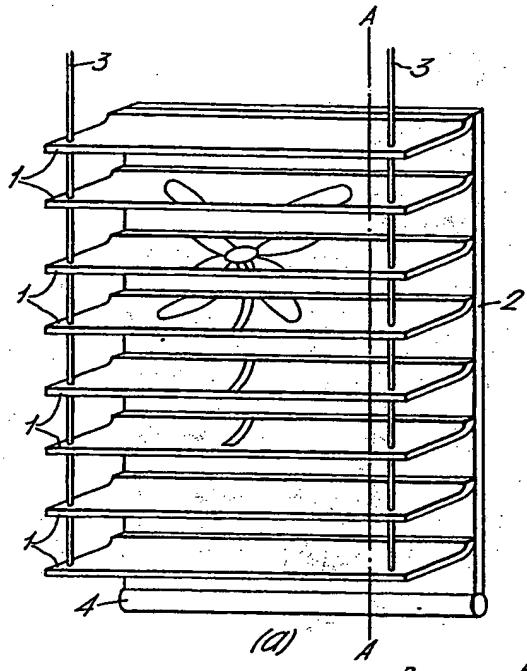
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7 SHEETS

COMPLETE SPECIFICATION

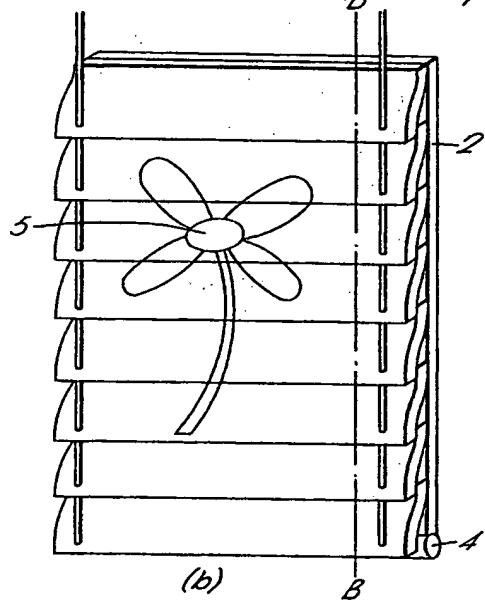
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SHEET 1



(a)

FIG. 1



(b)

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SHEET 2

FIG. 2.

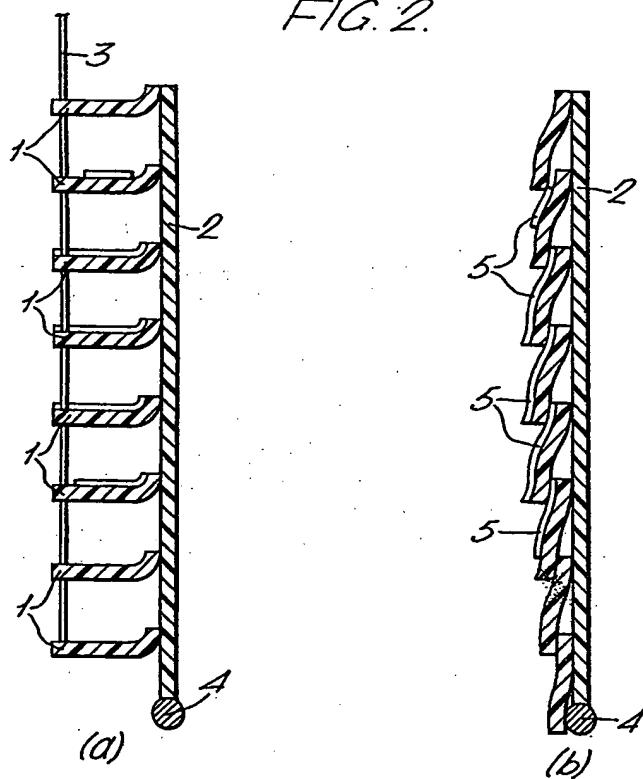
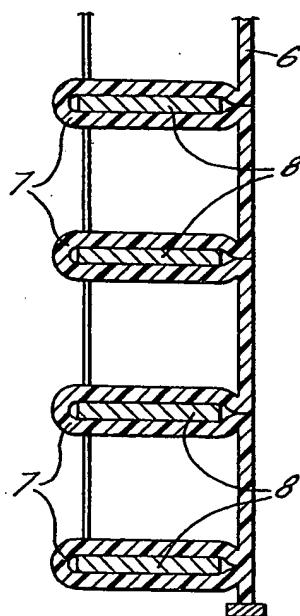


FIG. 3.



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SHEET 3

FIG.4.

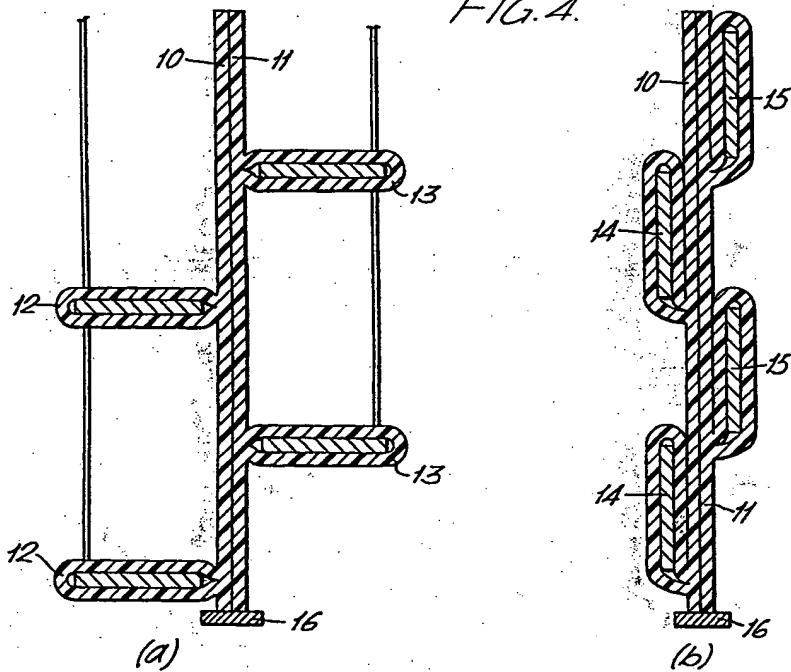
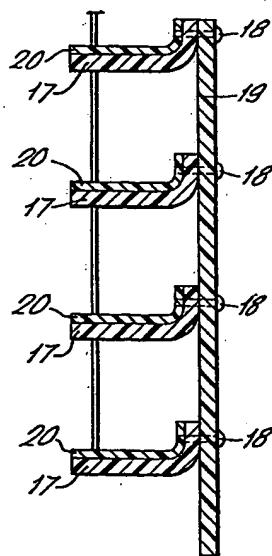


FIG.5.



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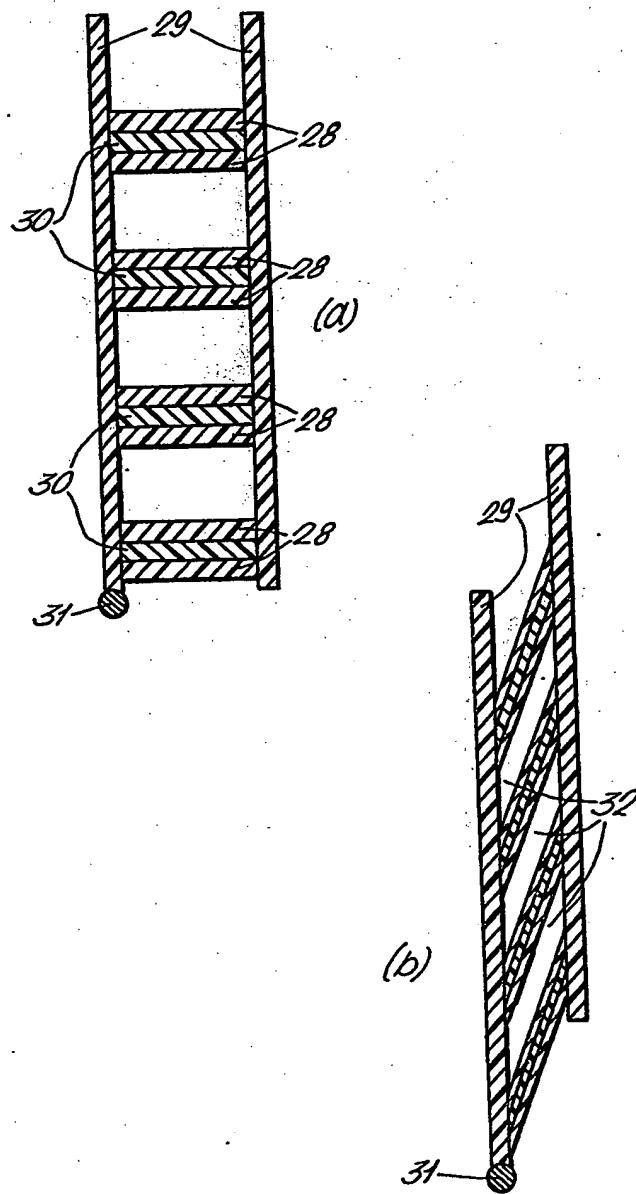
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SHEET 5

FIG. 7.



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SHEET 6.

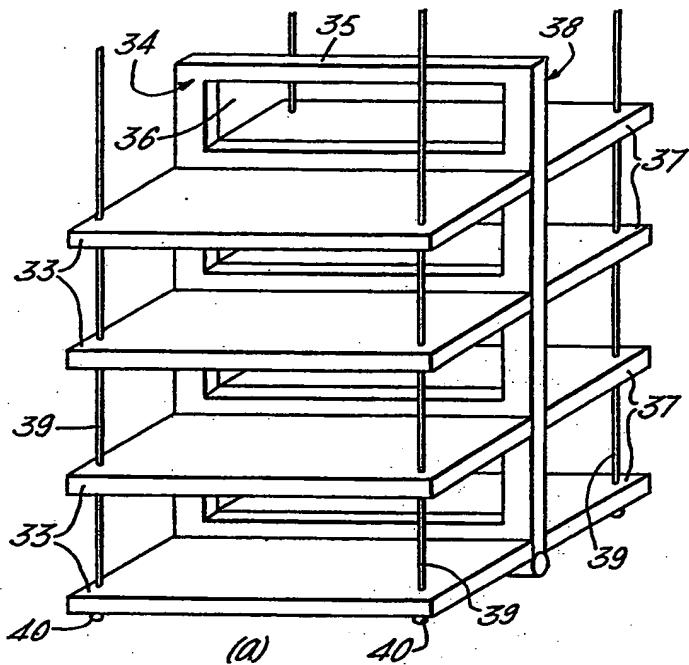
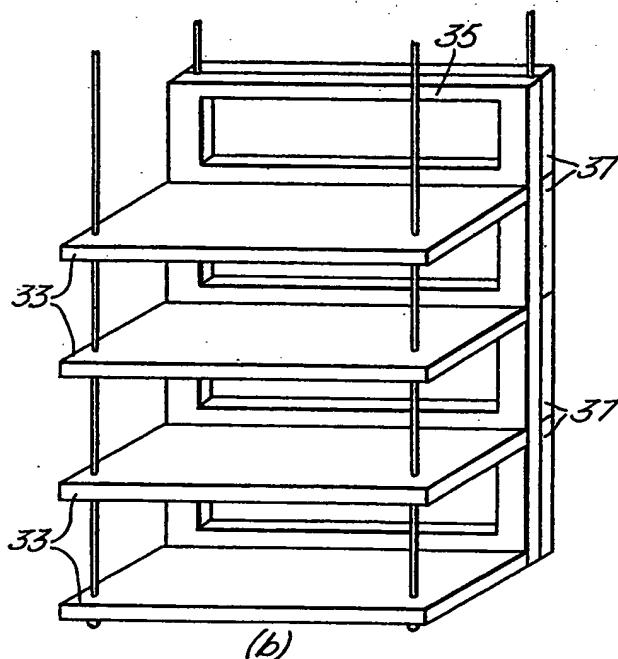


FIG. 8.



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SHEET 7

